



Technical Guideline No. 07 – Deployment of biological and chemical passive samplers

Jan Brant

2014

To be used in conjunction with:

**GUIDELINES FOR THE ENVIRONMENTAL MONITORING
AND IMPACT ASSESSMENT ASSOCIATED WITH SUBSEA
OIL RELEASES AND DISPERSANT USE IN UK WATERS**

1 Purpose and Scope

Deployment of mussels and/or passive samplers gives an indication of accumulation of contaminants over a period of time, usually weeks or even months. In passive samplers, this can give an estimation of the time weighted average concentration that the samplers have been exposed to, and in mussels can give an indication both of the accumulation of contaminants, and also the effects, by looking at biomarkers within the mussels.

This guidance document describes the process of deploying, retrieving and storing samples for further analysis. It does not include either chemical or biomarker procedures.

This document supports and should be used in conjunction with environmental monitoring guidelines for subsea oil releases (Law et al., 2014).

2 Health and Safety considerations

Passive samplers and mussels will be deployed either from a large vessel, or a small boat which allows access to the water surface. When deploying gear from the deck of a boat, appropriate PPE should be worn. This includes, but is not limited to, toe protected waterproof boots, lifejacket and hard hat. Before the survey starts, the scientist-in-charge (SIC) and ship's safety officer should ensure that all scientists and crew have been adequately briefed in relation to the safe operating procedures relating to the deployment and recovery of the equipment to be used.

3 Procedure

3.1 Passive Sampler deployment

Passive samplers should be kept isolated from potential sources of contamination at all times except when being exposed at the sampling site. Ensure that the passive sampling devices are stored and transported in gas tight containers, avoiding the use of plastic materials. Avoid physical contact with the receiving phase or membrane (use nitrile gloves). For some passive sampling devices it may be necessary to minimize exposure to airborne contaminants. Passive sampling devices and resultant extracts should not be stored in proximity to other chemicals, particularly volatile chemicals.

There are many types of passive sampler available. Some are designed to accumulate metals, some hydrophobic organic compounds, and some hydrophilic organic compounds, although there is a certain amount of cross-over. For monitoring of oil pollution, a hydrophobic sampler should be utilised. These include (but are not limited to) silicon rubber, SPMD and LPDE samplers. Samplers should be deployed to ensure that they remain submerged for the duration of the deployment. All of these samplers can be calibrated for environmental conditions and sampling rate by use of performance reference compounds (PRCs), which has the advantage of being able to calculate back to water concentrations. These PRCs though can have activity in a range of bioassays and so should not be used in samplers where subsequent extracts are to be used for toxicity testing.

3.1.1 Deployment

- i. Remove sampler from jar and attach to sampler frame using stainless steel forceps
- ii. Attach rope or chain to the sampler frame
- iii. Lower frame into water to the desired depth (sampler should remain submerged throughout deployment)
- iv. Secure rope/chain to buoy/ship/lander as appropriate
- v. Samplers should be deployed for a minimum of 2 weeks, but preferably 4-6 weeks.
- vi. Record date and time of deployment

3.1.2 Passive Sampler Retrieval

- i. Retrieve frame from water
- ii. Remove sampler from frame using stainless steel forceps
- iii. Rinse surface of sampler gently with deionised water
- iv. Place sampler into clean glass or metal jar
- v. Record date and time of retrieval
- vi. Label with samples site number, date and time.
- vii. Samplers should be stored at -20 °C until extracted.

3.2 Mussel Deployment

Prior to deployment, mussels should be kept in aerated seawater tanks. Once removed from the tanks, mussels should be kept cool and damp. The maximum time between removal from the tank and deployment should be 24 h. Mussels should be obtained from a site known to be free of contamination and one set of the mussels collected should be sacrificed prior to deployment to act as a known baseline. A second set of mussels should be maintained in clean aerated seawater for the duration of the deployment to act as a control. Each set of mussels should contain a minimum of 50 individual mussels of greater than 2.5 cm in length. Mussels should be deployed so that they are submerged for the duration of the deployment, but should not be in contact with the sediment surface.

- i. Place a minimum of 50 mussels into a flexible mesh bag
- ii. Attach bag to sampling frame
- iii. Lower frame into water to the desired depth
- iv. Secure rope/chain to buoy/ship/lander as appropriate
- v. Mussels should be deployed for a minimum of 2 weeks, but preferably 4-6 weeks.
- vi. Record date and time of deployment

3.2.1 Mussel Retrieval

- i. Retrieve frame from water
- ii. Remove mussels from frame
- iii. Scrape off extraneous material from the shells and scrub them clean using de-ionised water
- iv. If possible, place mussel bags in clean sweater for 24 h to depurate sediment from stomach
- v. Record date and time of retrieval
- vi. Measure and weigh each mussel and record
- vii. Shuck mussels while still live and retain soft tissue
- viii. Store mussels at -20 °C until extracted for chemical analysis. Preservation for biomarker analysis varies and may require live mussels. Specific assay protocols should be consulted for this information.

4 References

Law, R.J., Brant, J.L., Kirby, M.F., Lee, J. Morris, D. and Rees, J. 2014. Guidelines for the environmental monitoring and impact assessment associated with subsea oil releases and dispersant use in UK waters. Science Series Technical Report. Cefas, Lowestoft, 58 pp.



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